

## Abstract

A material processing system including a process tool and a process performance prediction system. The performance prediction system includes sensors coupled to the tool to measure tool data and a controller coupled to the sensors to receive tool data, where the controller is configured to predict the process performance for the tool using the tool data. A method for detecting a fault in a material processing system using a process performance prediction model is also provided. The method includes preparing the tool, initiating a process in the tool, and recording tool data to form to a tool data matrix. The method also includes performing a matrix multiplication of the tool data matrix and a correlation matrix to form predicted process performance data, where the correlation matrix includes the performance prediction model, comparing the predicted data with target data, and determining a fault condition of the processing system from the comparing step.

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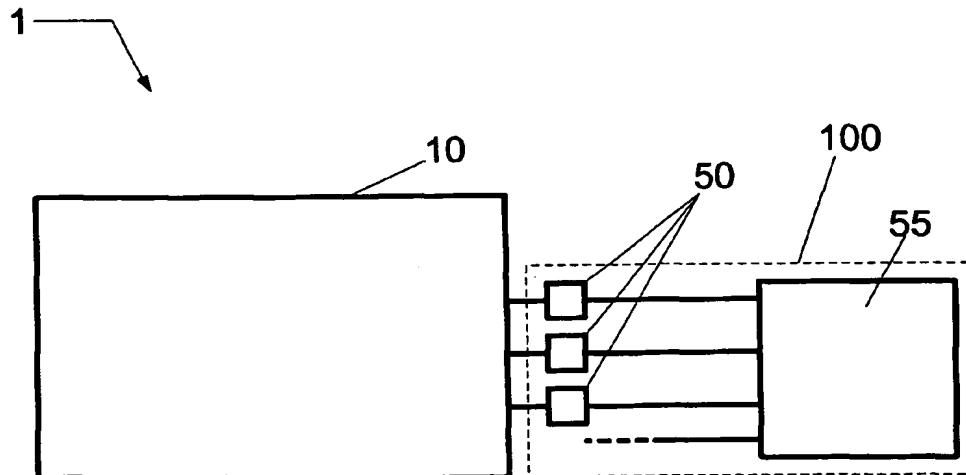
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